

**IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF CALIFORNIA  
SAN JOSE DIVISION**

**CONFIDENTIAL – TO BE FILED UNDER SEAL  
SUBJECT TO PROTECTIVE ORDER**

**IN RE: HIGH-TECH EMPLOYEES ANTITRUST  
LITIGATION**

**No. 11-CV-2509-LHK**

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**THIS DOCUMENT RELATES TO:**

**ALL ACTIONS**

**EXPERT REPORT OF ALAN MANNING, PH.D**

**October 28, 2013**

**TABLE OF CONTENTS**

	<b><u>Page</u></b>
Experience and Qualifications .....	1
The Assignment .....	1
Executive Summary .....	2
The Nature of the Restraint.....	4
Summary of Why the Conspiracy Is Likely to Have Reduced Compensation for a Large Number of Employees .....	5
The Importance of Job Opportunities and Information for a Well-Functioning Labor Market .....	6
Labor Markets Are Imperfectly Competitive.....	8
Empirical Evidence Regarding Labor Markets is Inconsistent with Dr. Murphy’s Opinion. ....	11
The Conspiracy Is Likely to Have Had a Large Effect on Job Opportunities and the Quality of Information Available to Workers.....	15
Dr. Murphy’s Conclusions Imply Much Of Defendants’ Behavior Makes No Sense. ....	17
The Conspiracy Is Likely to Have Generally Harmed Defendants’ Employees .....	19
The Regression Analyses Suggest The Impact on Compensation Was Large .....	25
Conclusion .....	25

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### **Experience and Qualifications**

1. My name is Alan Manning. I am an economist specializing in the analysis of labor markets. I have published one book and more than 60 articles in peer-reviewed international journals on the subject. My CV is attached as Exhibit A. Although I have written on a wide range of labor market issues, I am a particular specialist in the economics of labor markets, expertise that is highly relevant to this case. My main publications in this area are a book, 'Monopsony in Motion: Imperfect Competition in Labor Markets', published in 2003 by Princeton University Press, the chapter 'Imperfect Competition in Labor Markets' published in 2011 in the Handbook of Labor Economics, vol. 4, edited by Orley Ashenfelter and David Card, and numerous journal articles.
2. I am a Professor of Economics in the Department of Economics at the London School of Economics (LSE), one of the leading economics departments in the world. I have also held visiting positions at Princeton University, the University of California, Berkeley and Massachusetts Institute of Technology. At LSE, I conduct research and teaching in the field of labor economics and applied microeconomics more generally. In July 2012 I completed a 3-year term of office as chair of the department at LSE.
3. I served from 2004 to 2011 as one of the editors of the Journal of Labor Economics, the leading journal in the field. I am also an Associate Editor of the American Economic Journal (Applied) and Labor Economics.
4. I have been called upon to give advice on labor market issues facing the UK economy. For example, from 2004-2011, I was a member of the NHS Pay Review Body making recommendations to government on the appropriate level of pay for all staff employed in the UK National Health Service with the exception of doctors, dentists and very senior managers (about 1.2 million workers in total).
5. My compensation for time spent on this case is \$650 per hour. The compensation does not depend on the opinions I express or the conclusions I draw. My analysis is ongoing and I reserve the right to revise my opinions as additional information becomes available to me.

### **The Assignment**

6. I have been asked by counsel for the Plaintiffs to consider the likely effect on compensation of the conspiracy at issue in this case. I have specifically been asked to review and comment on the prior testimony of Drs. Leamer, Hallock, Murphy and Shaw. I have also been asked to develop my own views on the conspiracy and its probable effect, based on my expertise as an economist specializing in labor markets and labor market theory.

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7. In carrying out my assignment I studied the conspiracy alleged by Plaintiffs, in particular the agreements between the Defendants and other evidence on their implementation in practice as shown by email and other documents in the discovery record as well as testimony from a number of the witnesses. In addition, I read the expert reports that have been produced in this case by Drs. Leamer, Hallock, Murphy, and Shaw. A complete list of the materials I reviewed or relied on in preparing this report is attached as Exhibit B. I have relied on my knowledge of labor markets more generally to reach conclusions about the likely effect of the conspiracy on the relevant labor markets.

### **Executive Summary**

8. My conclusions are the following:
  - a. The conspiracy among the Defendants is likely to have suppressed competition in the labor market for their workers in a way that would be expected to have substantial effects on the compensation of those affected.
  - b. There are a number of ways in which the conspiracy is likely to have had the effect of reducing compensation:
    - i. Job opportunities and information are important to the functioning of labor markets.
    - ii. The agreements not to cold call each other's employees generally reduced job opportunities and the information available about labor market conditions, which information is of value to workers in order to decide whether their current job and remuneration is appropriate, thereby generally suppressing wages to the benefit of Defendants and to the detriment of members of the Class.
    - iii. Other restrictions on recruiting - such as agreements not to make counter-offers to an employee of one of the Defendants who applies for and gets a job offer at one of the other Defendants - would similarly have reduced competition for workers and also reduced the information available to workers about their true worth.

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- c. The damage is likely to have extended to the members of the Class<sup>1</sup>, not just those who would have been cold called or received a counter-offer in the absence of the agreements. This is likely for two reasons:
- i. Workers commonly use the experience of friends and colleagues as sources of information about labor market opportunities. The defendants in this case would certainly have known this.<sup>2</sup> The artificial restriction on the flow of information about job opportunities in the labor market will have made it harder for all workers to judge whether they are being fairly compensated in their current job and is likely to have affected whether they seek other opportunities.
  - ii. The Defendants have formal pay systems in which there are clear principles used in determining the compensation of employees. One of the most important principles is internal equity – the principle that differences in pay should be generally perceived to be fair by employees. It is typically not considered fair for workers to be paid more simply because they have been lucky enough to receive an alternative job offer. Cold calling from rival firms puts pressure on the principles under-pinning the pay system and is likely to lead to a general revision of pay levels. Knowing that one's workers are less likely to receive an attractive outside offer means it is likely that the Defendants were able to pay all workers doing these jobs a lower wage than they would have in the absence of the agreements.

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<sup>1</sup> I understand that the Court in this case has certified the following plaintiff Class: All natural persons who work in the technical, creative, and/or research and development fields that are employed on a salaried basis in the United States by one or more of the following: (a) Apple from March 2005 through December 2009; (b) Adobe from May 2005 through December 2009; (c) Google from March 2005 through December 2009; (d) Intel from March 2005 through December 2009; (e) Intuit from June 2007 through December 2009; (f) Lucasfilm from January 2005 through December 2009; or (g) Pixar from January 2005 through December 2009. Excluded from the Class are: retail employees; corporate officers, members of the boards of directors, and senior executives of all Defendants. Order Granting Plaintiffs' Supplemental Motion for Class Certification, October 24, 2013.

<sup>2</sup> See, e.g., INTUIT 039098 [REDACTED]

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- d. Labor markets are imperfectly competitive and are properly described as monopsonistic. The great weight of academic research, including empirical research, supports this conclusion.
- e. Evidence from labor markets more generally about the importance of informational flows and job opportunities in the careers of workers suggests that the extent of the damages caused by the conspiracy is likely to be significant over time.
- f. This conclusion is further supported by specific evidence in this case. First, it is clear from the documents that very senior executives working for the Defendants thought that enforcing the agreements was an issue of sufficient importance for them to spend their very valuable time on it. Second, the example of Google's 'Big Bang' shows that one of the Defendants decided it was best to raise the salaries for all employees when faced with competitive pressures.
- g. Estimating the actual size of the damages in this case requires the analysis of data from the Defendants. I have not analysed the data myself. However, in forming my opinions I have considered and relied on the statistical work performed by Dr. Leamer. His work is both methodologically sound and also of the kind that economists rely on in forming opinions such as those that I express here.

### **The Nature of the Restraint**

- 9. As described more fully in the discovery record and other expert reports, the Defendants' conspiracy here consisted of a network of bilateral restrictions on their ability to 'cold call' one another's employees in an effort to recruit them away. Some of the restrictions went further than 'no cold calling' and contained other terms further restricting even circumstances where an employee of one firm applied for a job at another firm on his or her own, with no recruiting:
  - a. That a firm attempting to hire a worker from another firm, in response to an active application by the employee, would not increase its initial offer.
  - b. Not to make job offers to prospective job applicants without permission from their current employer.
  - c. To pre-notify the current employer that a job offer was going to be made to an applicant.
- 10. Cold calling is a common practice especially among employers who, like the Defendants, are trying to recruit passive talent. Passively sourced candidates are often attractive because they are of higher quality. That this is the case for the Defendants is clear from

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an email of Mark Bentley (of Apple) on 9th May 2007 where he wrote that [REDACTED]

[REDACTED] Similarly, a Google presentation from May 2006 notes that [REDACTED]

From this I conclude that it is clear that the Defendants would have used cold calling of each other's employees in the absence of the agreements. What is anti-competitive is an agreement that restricts the flow of job opportunities to one's own employees. As Ed Colligan, CEO of Palm, wrote in an email of 8/24/2007 to Steve Jobs, CEO of Apple "we can't dictate where someone will work, nor should we try."<sup>5</sup>

**Summary of Why the Conspiracy Is Likely to Have Reduced Compensation for a Large Number of Employees**

11. I first provide a general analysis of the conspiracy to explain why the agreements are likely to have depressed the compensation of the Defendants' employees.
12. Job opportunities and information are important to the functioning of labor markets. The restrictions curtailed the availability of and information about alternative job opportunities in the market, and, for reasons explained in more detail later in this report, this is an important source of earnings growth over a typical worker's career.
13. The restrictions on cold calling are likely to have reduced the availability of information about alternative job opportunities, not just to those who would have been cold called in the absence of the agreements but also employees of the Defendants more generally. Many workers rely on information from colleagues and friends about labor market conditions to make decisions about whether they should stay with their current employer or seek out other opportunities.
14. The other part of the conspiracy that is likely to have reduced compensation is the agreement not to counter-offer if an employee of the defendant, having applied to another defendant, is made a job offer and the current employer tries to retain them by improving their terms and conditions. When a worker has two potential jobs, the worker's bargaining power is at its greatest and the ability to leverage this power is an important

<sup>3</sup> 231APPLE108086

<sup>4</sup> GOOG-HIGH-TECH-00024164; GOOG-HIGH-TECH-00024160; *see also* 76506DOC000773 (2009 Intel presentation entitled [REDACTED]

[REDACTED]”).  
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source of earnings growth in a typical career. The agreements, by allowing employers to collude against the worker, are likely to have reduced compensation.

15. The impact of the conspiracy on compensation is likely to have extended throughout and across the Class far beyond those who would have been cold called in the absence of the agreements, or received counter-offers, or heard indirectly about cold calling and the outcomes that came from it. Rather, the impact would have been felt company-wide. This is because recruitment or attempted recruitment of employees disturbs the principles that underpin company compensation policies and may necessitate general changes to the structure of compensation in order to maintain those principles.
16. The key idea under-pinning my conclusion that the agreements are likely to have depressed compensation is that economic principles suggest that the availability of job opportunities and information is important in raising compensation and, moreover, ensuring that labor markets are competitive and that workers are employed where they are most valued, maintaining the efficiency of labor markets. The next section fleshes out that argument.

### **The Importance of Job Opportunities and Information for a Well-Functioning Labor Market**

17. This section of my report outlines why the availability of job opportunities and the flow of information about them play a central role in the determination of compensation. Furthermore this effect on earnings is the reason why the ready availability of job opportunities and flow of information play an important role in ensuring the efficient allocation of labor thus ensuring a well-functioning competitive labor market. The Department Of Justice concluded the agreements were anti-competitive for this reason.
18. In economists' analysis of markets, the process by which wages (for labor markets) and prices (for product markets) are determined is often not spelled out explicitly – rather, it is simply written that wages/prices are determined by 'demand and supply' or 'the market,' when it is actually firms and/or workers who must be making those decisions. But it is instructive to think about the process by which compensation is determined, because this does bring out the critically important role played by the availability of job opportunities and the flow of information.
19. Employers decide what compensation package (typically consisting of a base salary, stock options, a performance-related element, and benefits) to offer which jobs to which workers. Workers will decide which employer they should work for, what job they will do, and how much they will accept for performing that job. It is competition among employers for workers that determines the level of compensation in a given labor market. Employers would like to pay wages that are as low as possible for particular skills or skill



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sets. But, to employ a worker, employers have to ensure that their position is considered the best on offer. More job opportunities for workers means that compensation will be higher as workers have more choice. Consequently restrictions on the ready availability of alternative job offers are likely to result in a lower level of compensation. Employers who want to keep down their payroll have an interest in restricting the flow of job opportunities and labor market information to their employees.

20. I think it is clear that the Defendants knew that one of the purposes of the conspiracy was to limit competition amongst themselves for workers and likely that this competition would have been intense in the absence of the agreements, as is evidenced by the use of metaphors involving terminology from violent conflict. In an email Sharon Coker of Lucasfilm wrote that [REDACTED] In discussing the problems caused by Facebook poaching employees from Google, Bill Campbell wrote [REDACTED] In his deposition George Lucas said that [REDACTED] Former Apple Sourcer Patrick Burke referred in his deposition that [REDACTED]. As Sergey Brin put it in his testimony, [REDACTED] But the usage of such strong language makes it clear that the Defendants thought competition could have a large overall effect on their workforces and pay structures.

21. The conspiracy is likely to have reduced compensation because it reduced alternative job opportunities and information about job opportunities. If, because of the web of agreements, workers were not cold called as often as they would otherwise have been, they are less likely to receive alternative job offers and information about labor market conditions. As a result the process which drives up compensation will be weakened.
22. Of course employers would otherwise prefer not to face competition for their workers. In addition, they may be inclined to see this competition as making it harder for them to retain their talent. But, competition per se does not mean one cannot retain valued workers. It simply means that one has to pay a higher wage to do so.

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<sup>6</sup> LUCAS00062590.

<sup>7</sup> GOOG-HIGH-TECH-00248336

<sup>8</sup> Deposition of George Lucas, March 28, 2013 at p. 184:13-16.

<sup>9</sup> Deposition of Patrick Burke at p 100:13-25 and 174:12-18.

<sup>10</sup> Deposition of Sergey Brin, March 19, 2013 at p. 37:17-20.

CONFIDENTIAL

23. Open competition among employers for workers is in the interests of society as a whole because it helps to ensure that workers are allocated to their most efficient usage.
24. If the wage offered by a potential employer is so high that it exceeds the value of the worker to his or her incumbent firm and hence the maximum wage this employer is prepared to pay, then that simply tells us that it would be more efficient for the worker to work for the other firm as the higher wage they are offered by that firm presumably reflects a higher value of the worker to that firm.
25. Economists commonly use the notion of a 'perfectly competitive' labor market as conceptual benchmark against which to set the operation of real-world labor markets. In a perfectly competitive market workers are fully informed about what every potential employer could offer them and can costlessly move between them, and so will choose to work for the employer who makes them the best offer (if workers only care about wages, this will be the employer who offers the highest salary but other factors are relevant in practice). Since employers know workers will choose between them in this way, this affects the contracts offered to workers.
26. In a perfectly competitive labor market, where there are large numbers of similar employers competing for a worker's services, the worker will end up being paid a wage equal to their value to firms, what is called their 'marginal product.' In this situation employers will feel they do not have market power and are faced with a market wage external to them and beyond their control – any attempt to pay below the market wage will lead to workers immediately quitting. In a perfectly competitive labor market, wages are simply determined by the forces of supply and demand.

### **Labor Markets are Imperfectly Competitive**

27. It has become increasingly recognized by many academic labor economists that labor markets in reality are far from perfectly competitive and that one cannot properly understand the workings of labor markets without recognizing the imperfections caused by the following: 1) workers are not fully informed about all alternatives available to them; 2) it is costly for workers to move between employers; and 3) there are important individual characteristics in employers such that workers do not have a large choice of essentially identical positions. For example, one cannot begin to make sense of the co-existence of unemployed workers and vacant jobs unless one understands that it takes both time and money to match the two together.

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28. Research into the implications of costly and imperfect information was started by George J. Stigler in two classic articles published 50 years ago.<sup>11</sup> The view that labor markets have substantial frictions in them and are not perfectly competitive is now supported by a wealth of evidence and academic research that cannot all be listed here. One way to emphasize how this view of labor markets has come to dominate academic opinion is to give examples of the balance of expert opinion. In 2010 the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (popularly known as the Nobel Prize in Economics) was awarded to Peter A. Diamond of MIT, Dale T. Mortensen of Northwestern University, and Christopher A. Pissarides of LSE “for their analysis of markets with search frictions.”<sup>12</sup> Almost all of their research (what is known as the search and matching framework) was about the analysis of frictions in labor markets caused by limited information.
29. The leading journal in the field, the *Journal of Labor Economics*, also devoted a whole issue to a set of papers on “monopsony” presented at a conference organized by Orley C. Ashenfelter and Henry Farber, both of Princeton, and Michael R. Ransom of Brigham Young University.<sup>13</sup> “Monopsony” literally means a single buyer of labor but the term is now used more commonly to refer to the situation where labor markets are not perfectly competitive and employers have some power over the wages they pay. Their introductory article concluded that “[t]he articles in this issue provide remarkable evidence that labor markets are far from competitive.”<sup>14</sup>
30. Limited information and mobility costs mean that employers will have some discretion (or power) over the wages they pay. Paying higher wages raises costs but makes it easier to recruit and retain workers. How employers resolve this trade-off will determine the level of wages in the labor market. This way of thinking about labor markets is often summarized under the heading of ‘search and matching’ or ‘monopsony’ models of the labor market.<sup>15</sup>

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<sup>11</sup> Stigler, George J., *The Economics of Information*, 69 J. POL. ECON. 3, June 1961, at 213-25 and Stigler, George J., *Information in the Labor Market*, 70 J. POL. ECON., Oct., 94-105 (1962).

<sup>12</sup> See Press Release, The Royal Swedish Academy of Sciences, The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2010 (Oct. 11, 2010),

[http://www.nobelprize.org/nobel\\_prizes/economics/laureates/2010/press.html](http://www.nobelprize.org/nobel_prizes/economics/laureates/2010/press.html)

<sup>13</sup> <http://www.jstor.org/stable/10.1086/650183>.

<sup>14</sup> Orley C. Ashenfelter, Henry Farber & Michael R Ransom, *Labor Market Monopsony*, 28 J. LAB. ECON. 203, 203-10 (2010).

<sup>15</sup> The standard references for the search and matching frameworks are Peter A. Diamond, *Mobility Costs, Frictional Unemployment, and Efficiency*, 89 J. POL. ECON. 798 (1981); Christopher A. Pissarides, *Short-run Equilibrium Dynamics of Unemployment Vacancies, and Real Wages*, 75 AM. ECON. REV. 676 (1985); and Christopher A. Pissarides EQUILIBRIUM

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31. As time has progressed labor economists better understand that labor markets are far from perfectly competitive. Still, they continue to use the perfectly competitive model to analyse situations where consideration of informational problems would add only complication and not insight. Economic models are best thought of as a map of the real world and different types of map are useful for different purposes. But in the consideration of the impact of the conspiracy in this case, it is clear that it is about the impact of a reduced flow of job opportunities and information. Hence, any analysis that rests solely on a view that perfect competition (with its assumption that information is perfect and job opportunities plentiful) is a good representation of the labor market is not reliable. In this regard the report of Dr. Murphy commits numerous errors of this type. For example, in opinion 3a, Dr. Murphy writes that “market price ... is determined by the supply and demand for labor. The alleged agreements affected neither the supply of nor the demand for labor....Therefore, there is no reason why they would affect market compensation.”<sup>16</sup> What he writes is correct if the labor market is perfectly competitive and workers have complete information and no mobility costs. But the issue here is whether the conspiracy reduced the information available to workers in a substantive way, so assuming complete information is incorrect and misguided.
32. It is also simply incorrect to imply, as does Dr. Murphy, that the market equalizes compensation across employers with the same skills and experience as one would expect it to do if the labor market was perfectly competitive. All empirical studies of labor markets have concluded that there is variation in wages that cannot be explained by “skills and experience.”<sup>17</sup> One might retort that we generally have imperfect measures of skills in these data sets so we can never be completely sure we are comparing equivalent workers, but instances like Google’s Big Bang - in which it raised salaries across the board by 10% - show that Dr. Murphy’s conclusions are implausible. If, as he would claim, all workers receive their value in the wider labor market, the policy of raising salaries by 10% for all existing workers simply means that Google was paying above the market wage for its workers, something that is hard to explain.
33. It may be helpful to consider the following thought experiment to convince oneself that labor markets do have significant informational problems and mobility costs and deviate

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UNEMPLOYMENT THEORY (2<sup>nd</sup> ed. 2000). For the monopsony approach the standard references are William, M. Boal & Michael, R. Ransom, *Monopsony in the Labor Market*, 35 J. ECON. LITERATURE 86 (1997); Kenneth Burdett & Dale T. Mortensen *Wage Differentials, Employer Size, and Unemployment*, 39 Int’l. Econ. Rev. 257 (1998), or Alan Manning *MONOPSONY IN MOTION: IMPERFECT COMPETITION IN LABOR MARKETS*, (2003).

<sup>16</sup> Expert Report of Professor Kevin M. Murphy, January 17, 2013, p. 20.

<sup>17</sup> See, e.g., Dale Mortensen *Wage Dispersion: Why Are Similar Workers Paid Differently?* (2005).

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considerably from the perfectly competitive ideal. Suppose that one's current employer reduces one's salary by a small amount. The economists' notion of a perfectly competitive market in which alternative offers are plentiful predicts that one will immediately quit because there is an equivalent employer down the road who offers the old salary and it is costless to move from one employer to another. However, you are unlikely to be in a position to quit immediately, though you might be resentful about the wage cut and it may well make you more likely to seek alternative jobs than before, as well as more likely to quit than before. Hence, labor markets have substantial imperfections.

34. The view that labor markets are imperfectly competitive also fits with the way in which people ordinarily experience labor markets. When asked open-ended questions about major life events, people list births, marriages, divorces, and deaths as the most important things in life; however, getting and losing jobs or promotions as major life events come next.<sup>18</sup> In the US General Social Survey, when asked whether respondents agree with the statement "it is not easy to find another job with the same income and fringe benefits," 30% agree when the unemployment rate is 4% (a boom) and 55% when the unemployment rate is 10% (a severe recession).<sup>19</sup>

**Empirical Evidence Regarding Labor Markets is Inconsistent with Dr. Murphy's opinion.**

35. To understand the effect of the conspiracy one needs to have some understanding of the way imperfect information and mobility costs affect labor markets. There is a well-established part of academic research on labor markets that does take such an approach, one that was pioneered 50 years ago by George Stigler who concluded his seminal article on the subject by writing that "our understanding of economic life will be incomplete if we do not systematically take account of the cold winds of ignorance."<sup>20</sup> In this section I discuss evidence from the operation of labor markets in general that support my case that Dr. Murphy's characterization of labor markets is mistaken and that restrictions on the flow of job opportunities and information can be expected to harm employees.

36. I discuss research in 3 main areas:

- a. *The dependence of quits on compensation and opportunities.* This research shows that an increase on job opportunities (as might be expected to have resulted in the

<sup>18</sup> See Table 1 in Alan Manning *Imperfect Competition in Labor Markets*, HANDBOOK OF LABOR ECONOMICS, p. 975 (Orley Ashenfelter & David Card eds. 2011) for British evidence on this.

<sup>19</sup> Figures taken from Figure 7 in Steve Davis & Till von Wachter *Recessions and the Costs of Job Loss*, BROOKINGS PAPERS ON ECONOMIC ACTIVITY 1-72 (2011), available at [http://www.brookings.edu/~media/projects/bpea/fall%202011/2011b\\_bpea\\_davis.pdf](http://www.brookings.edu/~media/projects/bpea/fall%202011/2011b_bpea_davis.pdf).

<sup>20</sup> George J. Stigler, *The Economics of Information*, 69 J. POL. ECON. 213, 224 (1961).

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absence of the agreements) would be expected to raise quit rates and that employers would be expected to raise compensation in response to this.

- b. *The wage gains from changing jobs.* This research shows that the salary gains on changing jobs is typically a large part of wage growth over a career so that restrictions on changing jobs would be expected to reduce the earnings of workers.
- c. *The costs of job loss.* This research shows that workers typically suffer substantial losses in earnings when they lose jobs through no fault of their own. This indicates that, contrary to the claims of Dr. Murphy, labor market opportunities are not very plentiful.

37. *The Dependence of Quits on Compensation and Opportunities.* There is a considerable amount of empirical evidence that workers' decisions to look for another job or to quit an employer depends on their current remuneration. The higher the salary offered by the current job, the less likely are workers to seek alternative opportunities<sup>21</sup> and to move jobs.<sup>22</sup> We also have evidence that the availability of alternative job offers affects quits. For example the JOLTS data produced by the Bureau of Labor Statistics shows that quit rates in the United States economy have fallen by 25% in the recession as it has become harder to get jobs.<sup>23</sup> Other academic research comes to the same conclusion.<sup>24</sup>

38. This research leads us to expect that if information about alternative job opportunities had been greater in the absence of the conspiracy, then quit rates would have increased and that the natural way to have responded to that would have been to pay higher salaries.

39. *The Wage Gains from Changing Jobs.* Academic research finds that those who change jobs voluntarily typically have faster wage growth than those who remain in the same job.

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<sup>21</sup> See, e.g., Table 9.3, Alan Manning, *MONOPSONY IN MOTION: IMPERFECT COMPETITION IN LABOR MARKETS* 252 (2003).

<sup>22</sup> This is a large literature but for a review of the estimates see Tables 6 and 7, pp. 1008 and 1010-1011, in Alan Manning, *Imperfect Competition in Labor Markets*, *HANDBOOK OF LABOR ECONOMICS* (Orley Ashenfelter & David Card eds. 2011). For recent studies also see Torberg Falch, *The Elasticity of Labor Supply at the Establishment Level*, 28 J. LAB. ECON. 237 (2010); Boris Hirsch, Thorsten Schank & Claus Schnabel, *Differences in Labor Supply to Monopsonistic Firms and the Gender Pay Gap: An Empirical Analysis Using Linked Employer-Employee Data from Germany*, 28 J. LAB. ECON. 291 (2010); and Michael R. Ransom & David P. Sims, *Estimating the Firm's Labor Supply Curve in a "New Monopsony" Framework: Schoolteachers in Missouri*, 28 J. LAB. ECON. 331 (2010).

<sup>23</sup> <http://data.bls.gov/timeseries/JTS000000000QUR>

<sup>24</sup> See, e.g., Michael W. L. Elsby, Bart Hobijn & Aysegul Sahin, *The Labor Market in the Great Recession*, *BROOKINGS PAPERS ON ECON. ACTIVITY* (Spring 2010), [http://www.brookings.edu/~media/projects/bpea/spring%202010/2010a\\_bpea\\_elsby.pdf](http://www.brookings.edu/~media/projects/bpea/spring%202010/2010a_bpea_elsby.pdf)



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This is what one would expect if workers typically change jobs for better jobs and remuneration is an important part of what makes for a better job. This gain from changing jobs varies across different types of workers but the overall contribution of job mobility to the earnings growth experienced by the typical worker over his life is substantial – the classic reference on the topic concludes that “wage gains at job changes account for at least a third of early-career wage growth.”<sup>25</sup>

40. This area of research suggests that the agreements, by restricting the opportunities for job mobility, will have had a sizeable adverse effect on the earnings of affected workers.

41. We do have evidence that this research is likely to be relevant to the present case. Figure 7 in Dr. Leamer’s report dated October 1, 2012 shows that [REDACTED]

[REDACTED] That conclusion is also supported by other evidence. George Lucas testified that [REDACTED]

[REDACTED] In his deposition Daniel McKell of Intel stated that [REDACTED]

[REDACTED] And Google’s strategy for dealing with Facebook’s aggressive recruiting strategy [REDACTED]

42. There is an important way in which the academic studies may underestimate the returns to alternative job opportunities as they only compare the earnings workers have if they leave to those if they stay. If an alternative job opportunity enables a worker to negotiate a higher salary from their current employer but decide to remain with them, this important benefit of the other job opportunity will not be captured in these estimates. In his deposition Patrick Burke said that [REDACTED]

<sup>25</sup> Robert H. Topel & Michael P. Ward, *Job Mobility and the Careers of Young Men*, 107 Q. J. ECON. 439, page 439 (1992).

<sup>26</sup> Deposition of George Lucas, March 28, 2013 at p.186:10-15.

<sup>27</sup> Deposition of Daniel McKell, March 20, 2013 at p 219:10-11.

<sup>28</sup> Deposition of Patrick Burke, February 26, 2013 at 161:2-4.

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43. *The Costs of Job Loss*. According to Dr. Murphy, workers should not be bothered by being involuntarily terminated from their jobs because they are being paid the market wage for their skills and compensation and the lost job can easily be replaced by another one at any of the very large number of potential employers in the labor market. That prediction is at variance with the conclusions of the research literature on the ‘costs of job loss.’<sup>29</sup> This literature looks at what happens to the earnings of workers after they lose jobs through no fault of their own (*e.g.* because the firm they worked for failed). If jobs are plentiful then we would expect to observe a rapid move into another job that pays a similar wage. But this is not what is found – instead, on average, there are large, long-lasting losses. For example, a recent study concluded that “men lose an average of 1.4 years of pre-displacement earnings if displaced in mass layoff events that occur when the national unemployment rate is below 6 percent. They lose a staggering 2.8 years of pre-displacement earnings if displaced when the unemployment rate exceeds 8 percent.”<sup>30</sup>
44. One also might seek in the academic literature a study of the implications of non-compete agreements of the type found among the Defendants. However, such agreements are, to the best of my knowledge, relatively rare and I am not aware of any academic analysis of a similar agreement. The closest example I am aware of is the analysis by Professor Suresh Naidu of Columbia University of the consequences of the anti-enticement laws passed in the American South in the years after the abolition of slavery.<sup>31</sup> Anti-enticement laws imposed criminal fines on planters attempting to poach labor already under an employment contract with another employer. The laws were therefore designed to restrict the availability of alternative job opportunities to black workers. The study found that when the fine was higher (so raising the penalty for poaching a worker), job-to-job mobility for black workers was reduced and their wages were lower. This study is obviously of a very different labor market in a very different period from the market under study, but it nevertheless shows the effect on compensation of restrictions on recruiting.

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<sup>29</sup> See, *e.g.*, Henry S. Farber, *Job Loss in the Great Recession: Historical Perspective from the Displaced Workers Survey, 1984-2010*, NBER Working Paper No. 17040 (May 2011) for historical estimates on the costs of job loss, [http://www.nber.org/papers/w17040.pdf?new\\_window=1](http://www.nber.org/papers/w17040.pdf?new_window=1) and Henry S. Farber *Job Loss in the United States, 1981-2001*, RESEARCH IN LABOR ECONOMICS, vol. 23 (2004), pp. 69-117 for a review of older literature.

<sup>30</sup> Steve Davis and Till von Wachter, *Recessions and the Costs of Job Loss*, vol. 43(2 (Fall)), BROOKINGS PAPERS ON ECON. ACTIVITY, 1 (2011) [http://www.brookings.edu/~media/projects/bpea/fall%202011/2011b\\_bpea\\_davis.pdf](http://www.brookings.edu/~media/projects/bpea/fall%202011/2011b_bpea_davis.pdf)

<sup>31</sup> Suresh Naidu, *Recruitment Restrictions and Labor Markets: Evidence from the Postbellum U.S. South*, 28 J. LAB. ECON. 413 (2010).



CONFIDENTIAL

45. This section has outlined why Dr. Murphy's view that the conspiracy could not have had a large effect on the labor market because that market is close to the economists' ideal of a perfectly competitive market with complete information and no mobility costs is mistaken. It has also provided supportive evidence from labor markets in general indicating that there are workers who typically care greatly about individual job opportunities, and are therefore likely to be harmed by a conspiracy that limited information and job opportunities even though only a small number of firms participated. I also note that my review of the discovery record in this case has not presented me with evidence that undermines this conclusion. Indeed that evidence is consistent with it.

**The Conspiracy is Likely to Have Had a Large Effect on Job Opportunities and the Quality of Information Available to Workers**

46. It is important to consider how much of a reduction in information and job opportunities were caused by the conspiracy. Dr. Murphy, in his Opinion 2, expressed the view that "the challenged conduct had no economically significant class-wide impact on the information about labor market opportunities and compensation available to Defendants' employees."<sup>32</sup> He based this conclusion on the assertion that the Defendants hire workers from and lose workers to many other firms that were not party to the agreements and that "[p]laintiffs and Defendants have vast amounts of available 'information'."<sup>33</sup>

47. Dr. Murphy suggests that the labor market at issue here is "characterized by extensive use of internet and other channels by both employees and employers to facilitate mobility and information flows, many publicly available data sources on salaries and opportunities, such as monster.com, dice.com, salary.com, etc.[ ] and networking among both current employees and university graduates who are recruited by technology firms and maintain friendships and contacts with fellow students and colleagues."<sup>34</sup> He draws the conclusion that any reduction in information about market opportunities from the conspiracy must be no more than a drop in an ocean of information and therefore could not have had any appreciable effect on the amount of information available and, through that, on market compensation.

48. Dr. Murphy invites us to conclude that the information available at salary.com (to give one example) is of similar quality to that one receives from a cold call asking if one is interested in a job at one of the Defendants, all of which are very prestigious employers. This is incorrect. For example, if one goes on salary.com and seeks information on the compensation being paid to a Software Engineer III in San Jose, California, one learns

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<sup>32</sup> Expert Report of Professor Kevin M. Murphy, January 17, 2013, p. 6.

<sup>33</sup> *Id.*, p. 64.

<sup>34</sup> *Id.*, p. 34.

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that the median salary plus bonus is about \$111k, with the bottom 10% earning about \$88k, the bottom 25% \$99k, the top 25% about \$123k and the top 10% \$134k.<sup>35</sup> To be sure, this can be useful information: if one were a Software Engineer III in that area and currently being paid \$50k, one might conclude it was a good idea to look for another job.

49. However, the information received in a cold call is of a higher quality and is more useful to workers. For example, the data from salary.com makes clear that there is large variation in the salaries being paid and it is simply not good enough information to conclude for sure whether one is being underpaid. Now compare that to a cold call from a recruiter asking if you are interested in a new job and perhaps even mentioning a “ballpark” salary figure in excess of what you are currently earning.<sup>36</sup> The cold call conveys much more specific, reliable and usable information. Even the mere fact of the cold call, regardless of whether salary is discussed, conveys information. There is a vast amount of information available about the labor market, but it varies enormously in quality and the quality of information is far more important than the quantity. The agreements had the effect of suppressing information of the highest quality and value to workers and the value to the employer of suppressing the information likewise is large.

50. Just as not all pieces of labor market information are of the same quality and value, so different job opportunities are not equally valuable. It is therefore misleading to characterize the labor market in the way that Dr. Murphy does: “Defendants compete for employees against a large number of other companies . . . the tendency is for compensation of employees with the same skills and experience to equalize across employers, because the labor markets in which these firms recruit and hire is broad and employees are mobile.”<sup>37</sup> Competition among employers for workers will vary depending on the companies involved. Dr. Murphy expressed this idea well when he wrote “competition may be more immediate with some firms than others,”<sup>38</sup> but did not seem to consider the implication of his statement: that the agreements among the Defendants would have had a particularly large effect on job opportunities because the competition among the Defendants is likely to have been more immediate, a conclusion borne out by the importance their top executives placed on these agreements, as further discussed below.

<sup>35</sup> <http://salary.com> (last accessed on October 15, 2013).

<sup>36</sup> Deposition of Chris Galy, March 20, 2013, 165:10-22 [REDACTED]

[REDACTED]  
Expert Report of Professor Kevin M. Murphy, January 17, 2013, p. 22.

<sup>38</sup> *Id.*

CONFIDENTIAL

51. Dr. Murphy also argues that the extent of hires between the Defendants is not sufficiently high to conclude that the conspiracy could have had a substantial detrimental impact on the affected workers.<sup>39</sup> However, it is not actual movement that is important here, but rather the potential to move. (Dr. Leamer's report terms this the difference between movement and mobility.) If one has a credible threat to move this is a useful tool in obtaining higher compensation. We have detailed evidence on how Google used counter-offers to attempt to address the problems caused by Facebook's aggressive hiring strategy. The benefits from cold calling in that case were clearly not confined to those who actually left Google for Facebook or other companies.

**Dr. Murphy's Conclusions Imply Much Of Defendants' Behavior Makes No Sense.**

52. First, Dr. Murphy's view is inconsistent with the evidence about the way in which the defendants behaved. It is clear that the Defendants did not think of competition between themselves as an irrelevance because they were only a small number of employers in a large undifferentiated labor market. The preamble to the agreement between Pixar and Lucasfilm states, [REDACTED] The email from Ed Colligan to Steve Jobs contains the phrase "this is a small space, and it's inevitable that we will bump into each other."<sup>41</sup> Adobe and Lucasfilm documents on recruiting all mention specific companies.<sup>42</sup> According to Dr. Murphy's analysis, these are meaningless statements because the Defendants are all trivially small in relation to the market as a whole.

53. That the market participants themselves do not think of themselves as being in a very large undifferentiated market is also indicated by the information they use to assess their position in the labor market. The Defendants do use information [REDACTED]

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<sup>39</sup> *Id.*

<sup>40</sup> PIX00002262.

<sup>41</sup> PALM000007.

<sup>42</sup> *See, e.g.*, LUCAS00013726; ADOBE\_068264.

<sup>43</sup> GOOG-HIGH-TECH-00193034.

<sup>44</sup> GOOG-HIGH-TECH-00379327.

<sup>45</sup> ADOBE\_068264.

CONFIDENTIAL

[REDACTED]

54. Second, it is clear that the agreements were regarded as important by senior executives of the Defendants. They were negotiated, confirmed and executed by top executives, not low-level managers or functionaries – [REDACTED]

[REDACTED]

The fact that CEOs of these companies felt the enforcement of the conspiracy important enough to spend their valuable time on is an indication that they perceived the agreements as being of consequence. Dr. Murphy's report would imply they were wasting their time because he has come to the conclusion that the conspiracy could have had no effect.

55. Third, Dr. Murphy's analysis would suggest that Google's "Big Bang" gave existing workers \$500 million<sup>53</sup> more than before for no good reason, because Google must have been forced by the intensity of market competition to pay the going rate for its workers in any case and giving them more was simply unnecessary.

56. Fourth, the Defendants concealed the conspiracy. Paul Otellini, CEO of Intel, wrote an email in September 2007 about the [REDACTED]

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<sup>46</sup> Declaration of Steven Burmeister in Support of Opposition to Class Certification, December 11, 2012 p. 4.

<sup>47</sup> LUCAS00184664.

<sup>48</sup> LUCAS00013705.

<sup>49</sup> 76583DOC002007

<sup>50</sup> 231APPLE002149.

<sup>51</sup> 231APPLE002143.

<sup>52</sup> GOOG-HIGH TECH-00000107-109.

<sup>53</sup> GOOG-HIGH-TECH-00194984-985 at 985.

CONFIDENTIAL

[REDACTED]

This suggests that the Defendants felt the agreements would, if known, be regarded by employees as harmful.

### **The Conspiracy is Likely to Have Generally Harmed Defendants' Employees**

57. There are a number of reasons to think that the restricted job opportunities and flow of information extended much wider than workers who would have been cold called or received counter-offers in the absence of the conspiracy.

58. First, information flows among workers so that the loss of information about job opportunities and more general information about the labor market is not confined to those who would have been cold called.

59. There is a large body of academic research documenting the importance of social networks in providing information about labor market opportunities. This literature is too large to describe in detail in this report but a few quotes convey the flavour. For example, Professor Mark Granovetter of Stanford University summarized this as “in most real labor markets, social networks play a key role. Prospective employers and employees prefer to learn about one another from personal sources whose information they trust . . . Because all social interaction unavoidably transmits information, details about employers, employees and jobs flow continuously through social networks.”<sup>56</sup> A recent survey by Professor Matthew O. Jackson of Stanford University makes the point that “the importance of social networks in the market is evident to anyone who has ever searched for employment.”<sup>57</sup> If a colleague (who may well also be a friend) was cold called, then information about jobs available with other employers and the salaries on offer is likely to flow to other workers, influencing their job search strategy. In fact, such transfer of information between workers is typically encouraged by cold callers, as shown by the email from [REDACTED]

<sup>54</sup> 76526DOC000011.

<sup>55</sup> Deposition of Patrick Burke, February 26, 2013 at 167:19-22.

<sup>56</sup> Mark Granovetter, *The Impact of Social Structure on Economic Outcomes*, Vol. 19, 1 J. ECON. PERSP. 36 (2005).

<sup>57</sup> MATTHEW O. JACKSON, *SOCIAL AND ECONOMIC NETWORKS*, 327 (Princeton University Press, 2008).

60. But the most important way in which the impact of the conspiracy will have affected large numbers of the Defendants' employees is through the effect that they likely had on the pay structure in general. Whether such an effect is plausible or not has been a main bone of contention in the expert reports that I have reviewed in writing this report.
61. It is clear that the Defendants had formal pay systems - principles that they used to determine who should get paid what. This has been demonstrated thoroughly in the report of Dr. Hallock. It is clear that one important principle used is that of "internal equity." The phrase itself is used by several of the Defendants in internal documents and similar sentiments are expressed by others. I understand that what is meant by internal equity as a principle in pay determination is that it is important that pay differentials are perceived as generally fair by employees and this is typically important because unjustified pay differentials cause widespread problems with morale and motivation.<sup>62</sup> For example, a recent study of UC Berkeley workers found that making available information about co-worker salaries had negative effects on those who were paid below average as compared to those who were paid above average – its findings correspond with intuition namely that perceptions of fairness are very important.<sup>63</sup>
62. The consideration of internal equity does not mean that all employees are paid the same, even those doing the same job, but it does typically mean that workers doing the same job at the same level of performance are paid similarly and that pay differentials across jobs are also seen as objective and fair. The important point for the analysis of the likely impact of the conspiracy in this case is that it is typically not regarded as fair for there to

<sup>63</sup> David Card & Alexandre Mas & Enrico Moretti & Emmanuel Saez, *Inequality at Work: The Effect of Peer Salaries on Job Satisfaction*, 102(6) AM. ECON. REV. 2981 (2011).

CONFIDENTIAL

be pay differentials for workers who are doing the same job at the same level of performance, except that one has been fortunate enough to have received an outside offer, *e.g.* through a cold call which has caused them to obtain a higher salary than before. The type of pay differential that results from this is not mentioned in any of the statements of pay philosophy that I have seen<sup>64</sup>. This is not to say that these pay differentials never occur – all of the pay systems have some individual discretion and it is conceivable that that discretion could give some flexibility in determining pay when there are outside offers.

63. But there are important limitations to this flexibility and extensive use of it starts to undermine the principles that are meant to be used in determining pay. It is bounded by the rules of the compensation system. The rules provide boundaries on discretion and ensure fairness. This is because having to make counter-offers to solicited employees (or bringing in new hires at salaries above those received by existing workers) is disruptive to the workforce and morale. In her deposition, Rosemary Arriada-Keiper stated that [REDACTED]

The problem posed by outside offers is expressed eloquently by Sergey Brin in his deposition: [REDACTED]

64. Thus, an employer concerned about recruiting by a particular competitor has an incentive to increase compensation pre-emptively to maintain morale and motivation and ward off defections. For example, [REDACTED]

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<sup>64</sup> For example, Steven Burmeister in his declaration opposing class certification summarizes that [REDACTED]

[REDACTED] Declaration of  
Steven Burmeister, December 11, 2012 at p.4.

<sup>65</sup> Deposition of Rosemary Arriada-Keiper, March 28, 2013 at 124:6-11.

<sup>66</sup> Deposition of Sergey Brin, March 19, 2013 at 39:3-7.

<sup>67</sup> *Id.* at 178:9-14.

CONFIDENTIAL

[REDACTED]

The degree of

competition is something employers consider in setting compensation, just as it is something participants consider in every other market.

65. This is perhaps easiest to understand by thinking of an example as it would play out in real time. Suppose we start from a situation in which the pay of all employees satisfies the “internal equity” principle. Now suppose one employee is cold called and offered another job. Let us also assume this employee now has a job offer at a level of compensation higher than they currently receive. Their current employer now has a decision to make: they could simply let the employee go or attempt to persuade them to stay with nothing more than words. But if the worker is thought a valuable employee, it is common to attempt to retain them by offering them a more attractive package.<sup>71</sup>

66. However, counter-offering causes the actual pay system to diverge from the principles on which it is supposed to be based. This is the case even if the only principle in deciding pay is “pay for performance” and internal equity only means that those with equal performance should receive equal pay. There is ample evidence from the documents I have seen that this was regarded as a serious problem. For example, an October 7, 2010 email from Tom Stocky at Google expresses concern that [REDACTED]

<sup>68</sup> PIX00050019 (emphasis added). *See also* Deposition of VanDerVoort, May 2, 2013 at 128:12-24 [REDACTED]

LUCAS00009707 [REDACTED]

”).

Deposition of Patrick Burke, February 26, 2013 at 110:18-21.

<sup>71</sup> *See, e.g.*, GOOG-HIGH-TECH-00248336 [REDACTED]

INTUIT\_039098-100.



CONFIDENTIAL

[REDACTED]

[REDACTED] Attempts to retain workers

who have attractive alternative job offers put considerable pressure on compensation systems.<sup>75</sup>

67. In her report, Dr. Shaw expressed the view that counter-offering is rare. “[B]ased on my experience, in relatively rare instances, pay may be adjusted to retain an employee when he/she receives an outside offer. I say these instances are relatively rare because pay increases are typically only offered to the high achievers. The lower achievers are allowed to leave.”<sup>76</sup> If it is “rare” for these firms to make counter-offers to their employees, it suggests that they may agree with me about the disruptive effects of relying on counter-offers, rather than adjustments to the pay structure, to counter-act the impact of competition for their workers.

68. Given the concerns of senior executives to maintain the agreements, the agreements are likely to have suppressed a considerable volume of cold calls and offers and counter-offers and this would put ever-increasing strain on the pay system and there would come a point at which this would be transmitted to the general pay structure.

69. We have clear evidence that this can happen from Google’s “Big Bang” of November 2010 that raised salaries for all employees by 10%. The rationale for this policy was that Google was facing increasing problems in recruiting and retaining the top talent it aspired to employ. That general shifts in pay are considered in the face of competitive pressures is also apparent from [REDACTED]

<sup>73</sup> *Id.*

<sup>74</sup> GOOG-HIGH-TECH-00194945.

<sup>75</sup> This also applies the other way as, in some cases, new hires may be paid more than existing workers doing the same job and this causes resentment. *See, e.g.,* APPLE039426 [REDACTED]

CONFIDENTIAL

70. It is important to realize that this general increase comes about because notions of fairness apply across jobs as well as within them even though it is harder to compare performance of workers doing different jobs. For example, Eric Schmidt

71. The reason for this general increase was that the other more individualized methods of responding to increased labor market competition that have been described earlier were causing more problems than they were solving. First, pay dispersion within the firm was being increasingly related more to who has been fortunate enough to receive an outside offer than to performance. Such pay differentials are often seen as unfair and can cause low job satisfaction and motivation. Secondly, if a firm acquires a reputation for only raising pay when faced with an actual threat to leave, this encourages workers to actively seek outside offers as this is the only way to raise their remuneration.

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<sup>77</sup> ADOBE\_008692

<sup>78</sup> Deposition of Eric Schmidt, February 20, 2013 at 206:18-22.

<sup>79</sup> Deposition of Patricia Murray, February 14, 2013 at 60:21-61:4.

<sup>80</sup> Adobe, Apple, Intel, Intuit, Lucasfilm, and Pixar maintained company-wide systems of job titles and levels as well. *See* Depositions of Rosemary Arriada-Keiper, March 28, 2013 at 20:6-7, 159:20-160:24, 189:8-191:16; Deposition of Jeffrey Vijungco, October 5, 2012 at 29:15-16; Deposition of Steven Burmeister, March 15, 2013 at 14:16-16:2; Deposition of Daniel McKell, March 20, 2013 at 59:3-9; Deborah Conrad, November 21, 2012 at 23:1-24:19; Deposition of Sharon Coker, November 1, 2012 at 246:6-20; Deposition of Stephanie Sheehy, March 5, 2013 at 78:19-24 and Deposition of Lori McAdams, August 2, 2012 at 29:8-17.

<sup>81</sup> Deposition of Daniel McKell, March 20, 2013 at 255:2-6.

CONFIDENTIAL

72. From the example of Google's "Big Bang" we know that companies such as the Defendants do respond in some situations to increasing competitive pressures in the labor market by a general increase in compensation.
73. The best way of evaluating the extent to which compensation in general was depressed is through regression analyses of the type conducted by Dr. Leamer. This approach attempts to estimate the gap between actual levels of compensation and what we would expect to have seen in the absence of the agreements, measuring the enhanced power of the Defendants over pay as a result of diminished competition.

#### **The Regression Analyses Suggest The Impact on Compensation Was Large**

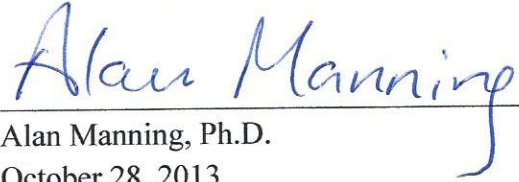
74. The reports of Drs. Leamer and Murphy both contain analyses of payroll data from the Defendants. I have read Dr. Leamer's report and, as indicated in other places in my Report, it is consistent with my conclusions and observations. I have not analysed the data myself, but I agree that the form of regression proposed by Dr. Leamer is an appropriate approach to measuring the impact of the conspiracy on worker compensation.

#### **Conclusion**

75. Economic principles and evidence about the operation of labor markets suggest that the availability of job opportunities and information about labor markets more generally play a crucial role in determining compensation and ensuring that labor is assigned to its most productive use.
76. The conspiracy restricted those alternative job opportunities and limited the flow of information to workers so is likely to have reduced compensation. Evidence from the Defendants themselves suggest this was the intention and the fact that some of the most senior executives thought the underlying agreements important enough to be spending their time on suggests the impact of the conspiracy was significant.
77. The harm from the conspiracy is likely to extend beyond those who would have been cold called and affected all members of the Class.
78. Economic principles and evidence explain why employers may respond to increased competition for workers with a general rise in compensation. Google's "Big Bang" shows that one of the Defendants has done this so it is reasonable to conclude that something similar would likely have happened in the absence of the conspiracy.

CONFIDENTIAL

79. To estimate the size of the damages, the regression analysis is an appropriate methodology and the best estimate is that the impact was sizeable.

  
Alan Manning, Ph.D.  
October 28, 2013

## **Exhibit A**

October 2013

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1981-84: Nuffield College, Oxford

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1983: MPhil Economics

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### **EMPLOYMENT**

Oct. 1984- Sept. 1989: Lecturer in Economics, Birkbeck College.

Oct. 1989- Sept.1993: Lecturer in Economics, London School of Economics.

Oct. 1993- Oct 1997: Reader in Economics, London School of Economics.

Oct 1997 -: Professor of Economics, London School of Economics

## OTHER POSITIONS HELD AND RESPONSIBILITIES

2009-2012	Head of Economics Department, LSE
2007-2008	Visiting Scholar, MIT.
2007 - Present	Member of Editorial Board, Applied Economics Journal.
2004-2011	Member of the NHS Pay Review Body
2004-2011	Editor of the Journal of Labor Economics
2004-2011	Member, Royal Economic Society Committee on Women in Economics
2000-present	Director, Labour Markets Programme, Centre for Economic Performance, LSE.
1999-2004	PhD Programme Director, Department of Economics, LSE.
1998-1999	Visiting Research Fellow, University of California, Berkeley.
1996-2006	Co-Editor, Economica
1994-1995	Visiting Associate Professor, Department of Economics, Princeton
1994-2004	Member of Editorial Board, New Economy
1993	Visiting Professor, Université de Paris I, Panthéon-Sorbonne.
1993-1998	Associate Editor, European Economic Review
1992-present	Associate Editor, Labour Economics.
1991-1992	Member of 'Economic Policy' Panel.
1990	Visiting Research Fellow, Institute for International Economic Studies, University of Stockholm.
1988-2006	Research Fellow, Centre for Economic Policy Research.
1988	Visiting Assistant Professor, School of Business Administration, University of California, Berkeley,
1988-1995	Member of Editorial Board, Review of Economic Studies.

## KEYNOTE LECTURES AT CONFERENCES

September 2012	Keynote Lecture, Verein fur Socialpolitik (German Economic Association), Annual Conference, Gottingen, Germany.
June 2010	Keynote Lecture, European Society of Population Economics, Essen, Germany
October 2004	Keynote Lecture, Applied Econometrics Association Conference on Econometrics of Labour Demand, Mons Belgium.
March 2004	President's Lecture, Scottish Economic Society, Perth.
April 2003	Review of Economic Studies Lecture, Royal Economic Society, Warwick.
Sept. 2002	Adam Smith Lecture, European Association of Labour Economics, Paris.

## PUBLICATIONS

### Books

Monopsony in Motion: Imperfect Competition in Labor Markets, Princeton University Press, 2003.

### Articles in Refereed Journals

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“One Nation Under a Groove? Identity and Multiculturalism in Britain”, Journal of Economic Behavior and Organization, forthcoming (with Andreas Georgiadis).

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“The Part-Time Pay Penalty for Women in Britain”, Economic Journal Features , 2008, 118, F28-F51 (with Barbara Petrongolo).

“Just Can’t Get Enough: More on Skill-Biased Change and Unemployment” Oxford Bulletin of Economics and Statistics, 2007, 69, 635-666 (with M.Manacorda).

“Lousy and Lovely Jobs: The Rising Polarization of Work in Britain”, Review of Economics and Statistics, 2007, 89,118-133 (with Maarten Goos).

“The incidence of UK housing benefit: Evidence from the 1990s reforms”, Journal of Public Economics, 2006, 90, 799-822 (with Stephen Gibbons).

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“Has The National Minimum Wage Reduced UK Wage Inequality?”, Journal of the Royal Statistical Society Series A, 2004, 167, 613-626. (with Richard Dickens).

“Instrumental Variables in Models with Binary Treatment Effects: A Simple Exposition”, Contributions to Economic Analysis & Policy, 2004, Vol. 3: No. 1, Article 9.

“Spikes and Spill-overs: The Impact of the National Minimum Wage on the Wage Distribution in a Low-Wage Sector”, Economic Journal Conference Papers, 2004, 114, C95-C101 (with Richard Dickens).

“Monopsony and the efficiency of labour market interventions”, Labour Economics, 2004, 11, 145-163.

“We Can Work It Out: The Impact of Technological Change on the Demand for Low-Skill Workers”, Scottish Journal of Political Economy, 2004, 51, 581-608.

“Something in the Way She Moves: A Fresh Look at an Old Gap”, Oxford Economic Papers, 2004, 56, 169-188 (with H.Robinson).

“Where the Minimum Wage Bites Hard: The Introduction of the UK National Minimum Wage to a Low Wage Sector”, Journal of the European Economic Association, 2003, 1(1), 154-180 (with Stephen Machin and Lupin Rahman)

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**Exhibit B: Documents used in the preparation of Manning expert report<sup>82</sup>**

Court Orders, Pleadings and Motions<sup>83</sup>

Plaintiffs' Notice of Motion and Motion for Class Certification, and Memorandum of Law in Support (October 1, 2012)

Plaintiffs' Consolidated Reply In Support of Motion for Class Certification and Opposition to Defendants' Motion to Strike the Report of Dr. Edward Leamer (December 10, 2012)

Plaintiffs' Supplemental Motion and Brief in Support of Class Certification, (May 10, 2013)

Plaintiffs' Reply in Support of Supplemental Class Certification Motion (July 12, 2013)

Declarations

Declaration of Edward T. Colligan (August 7, 2012)

Declaration of Non-Party Sheryl Sandberg (May 17, 2013)

Depositions

Deposition of Mark Bentley, August 23, 2012

Deposition of Sergey Brin, March 19, 2013

Deposition of William Campbell, February 5, 2013

Deposition of Ed Catmull, January 24, 2013

Deposition of Bruce Chizen, March 15, 2013

Deposition of Alan Eustace, February 27, 2013

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<sup>82</sup> I also relied on the academic papers cited in my Report.

<sup>83</sup> Unless otherwise specified, all documents are from In re High-Tech Employees Antitrust Litigation, 11-cv-2509 (N.D. Cal.)

Deposition of Patrick Flynn, April 3, 2013

Deposition of Chris Galy, March 20, 2013

Deposition of Arnnon Geshuri, August 17, 2012

Deposition of Danielle Lambert, October 2, 2012

Deposition of George Lucas, March 28, 2013

Deposition of James Morris, August 3, 2012

Deposition of Donna Morris, August 21, 2012

Deposition of Jonathan Rosenberg, March 13, 2013

Deposition of Eric Schmidt, February 20, 2013

Deposition of Deborah Streeter, April 5, 2013

Deposition of Jeffrey Vjungco, October 5, 2012

Deposition of Jan Van Der Voort, February 5, 2013

Deposition of Pamela Zissismos, November 13, 2012

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Expert Witness Report of Kevin F. Hallock, May 10, 2013.

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Expert Report of Professor Kevin M. Murphy, November 12, 2012.

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Exhibits

Exhibit 17 [231APPLE002140]

Exhibit 23 [GOOG-HIGH-TECH-00b336] (Harvey Decl)

Exhibit 27 [76592DOC015613] (Harvey Decl)

Exhibit 27 [GOOG-HIGH TECH-00007725]

Exhibit 29 [GOOG-HIGH TECH-00008283] (Shaver Decl)

Exhibit 37 [GOOG-HIGH TECH-00056790] (Shaver Decl)

Exhibit 45 [ GOOG-HIGH-TECH-00193360] (Shaver Decl)

Exhibit 46 [GOOG-HIGH-TECH-00193377] (Shaver Decl)

Exhibit 48 [GOOG-HIGH-TECH-00194984] (Shaver Decl)

Exhibit 49 [GOOG-HIGH TECH-00196286] (Shaver Decl)

Exhibit 58 [INTUIT\_000013] (Shaver Decl)

Exhibit 59 [INTUIT\_039098] (Shaver Decl)

Exhibit 61 [PIX00000229] (Shaver Decl)

Exhibit 67 [PIX00006023] (Shaver Decl)

Exhibit 472 [GOOG-HIGH-TECH-00195005]

Exhibit 614 [GOOG-HIGH-TECH-00379327]

Exhibit 616 [GOOG-HIGH-TECH-00210242]



Exhibit 666 [GOOG-HIGH-TECH-00248307]

Exhibit 668 [GOOG-HIGH-TECH-00248336]

Exhibit 697 [LUCAS00009707]

Exhibit 303 [Adobe\_052404]

Exhibit 389 [76616DOC005974]

Exhibit 625 [GOOG-HIGH-TECH-00194721]

Exhibit 916 [INTUIT\_016652]

Exhibit 2823 [Adobe\_025894]

Exhibit 129 [PIX00002262]

Exhibit 139 [PIX00004883]

Exhibit 161 [PIX00003419]

Exhibit 163 [PIX00015306]

Exhibit 172 [GOOG-HIGH TECH-00024150]

Exhibit 173 [GOOG-HIGH-TECH-00193034]

Exhibit 176 [GOOG-HIGH TECH-00000004]

Exhibit 177 [GOOG-HIGH-TECH-00058573]

Exhibit 178 [GOOG-HIGH-TECH-00058626]

Exhibit 182 [GOOG-HIGH-TECH-00008283]

Exhibit 183 [GOOG-HIGH-TECH-00008342]

Exhibit 187 [231APPLE002149]

Exhibit 192 [GOOG-HIGH-TECH-00000107]

Exhibit 199 [231APPLE002140]

Exhibit 202 [40026DOC000011]

Exhibit 223 [231APPLE002143]

Exhibit 250 [231APPLE006876]

Exhibit 274 [231APPLE002143]

Exhibit 277 [231APPLE002149]

Exhibit 278 [231APPLE002150]

Exhibit 279 [231APPLE002151]

Exhibit 326 [LUCAS00062590]

Exhibit 369 [PIX00003599]

Exhibit 410 [Adobe\_001096]

Exhibit 420 [PIX00006025]

Exhibit 421 [PIX00006023]

Exhibit 424 [PIX00009182]

Exhibit 472 [GOOG-HIGH-TECH-00195005]

Exhibit 557 [GOOG-HIGH-TECH-00058850]

Exhibit 563 [231APPLE073139]

Exhibit 597 [GOOG-HIGH-TECH-0056882]

Exhibit 614 [GOOG-HIGH-TECH-00379327]

Exhibit 648 [GOOG-HIGH-TECH-00265514]

Exhibit 650 [GOOG-HIGH-TECH-00265638]

Exhibit 651 [GOOG-HIGH-TECH-00058868]

Exhibit 653 [GOOG-HIGH-TECH-00058495]

Exhibit 666 [GOOG-HIGH-TECH-00248307]

Exhibit 668 [GOOG-HIGH-TECH-00248336]

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Exhibit 1309 [PIX00049648]

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Exhibit 1753 [GOOG-HIGH-TECH-00325500]

Exhibit 1868 [GOOG-HIGH-TECH-00550729]

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Exhibit 1871 [GOOG-HIGH-TECH-00061052]

Exhibit 2800 [ADOBE\_068264]

Exhibit 2823 [Adobe\_025894]

Exhibit 563 [231APPLE073139]

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GOOG-HIGH-TECH-00054804

GOOG-HIGH-TECH-00193217

GOOG-HIGH-TECH-00193406

GOOG-HIGH-TECH-00193435

GOOG-HIGH-TECH-00194945

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